# Fire Program Analysis – Initial Response Module

## Mopup Production Rates

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**Title:** Mopup Production Rates and Deployment Cost Calculation

**Issue:** The Initial Response module of FPA needs a fire event mopup production rate to calculate the fire event deployment cost. Modeling only the containment of the fire events is an incomplete solution to the Initial Response workload.

**Background:** The preparedness module models containment of fire events based on published fireline construction production rates and then calculates the associated deployment costs for the fire resources deployed. The FPA team has recognized that containment costs are only part of the normal deployment expenditures on fires. The full effort is often partitioned into three stages; 1) containment, 2) control, and 3) fire out. FPA-IR will not attempt to calculate deployment cost for all three phases, but will attempt to capture some of the deployment costs associated with controlling the fire event (i.e. mopup).

The effort needed to mopup any given fire varies, and no mopup production rates are available for the FPA-PM model effort.

**Proposal:** The development team proposes the following simple subjective mopup rules until scientifically credible and peer reviewed mopup rates are available.

The variables for mopup are assumed similar to those used in line production: type of fire resource; size of crew; fire behavior fuel model; and specific condition are the most important variables. To keep the modeling effort simple mopup effort assumptions are:

- Mopup will be assumed to be proportional to the line production effort of engine crews (with water).
- Control objectives are met when the perimeter is controlled, not when the entire fire event has been mopped up.
- One chain of fire event perimeter receives one square chain of mopup effort.
- The firefighter cost per hour is $20/hour.

Based on the mopup experience of the FPA development team, we have assumed that in fuel model 2 mopup would be 1.25 square chains per hour per person. [One individual can mopup one acre per eight hour day, 10 square chains per acre yields 1.25 sq.ch./hr.] The calculated mopup effort factor applied to each fuel model and specific condition is .41. [1.25 sq.ch./hr. / 3.0 ch./hr. = .41.] (Fuel model 2 mopup production) divided by (Fuel model 2 fire line production rate) equals mopup factor

The table below provides the proportional mopup effort for each chain of fire event perimeter for fire behavior fuel model and specific condition.

The mopup rate multiplied by the individual cost rates would allow the calculation of mopup deployment costs to be added to the containment deployment cost.

**Additional Reference:** FPA White Paper, Source of Fire Resource Production Rates v2.3

| Fire Behavior Fuel Model & Specific Condition | Line Production Rates for Engine Crews Chains/hour | Mopup Production Rates Chains$^2$/hour | Mopup Cost per Chain or Perimeter |
|---|---|---|---|
| 1 -Short Grass - Grass | 6 | 2.5 | 8 |
| 1 - Short Grass - Tundra | 2 | 0.8 | 25. |
| 2 - Grass Understory | 3 | 1.2 | 17 |
| 3 - Tall Grass | 2 | 0.8 | 25 |
| 4 - Chaparrel - Chaparrel | 2 | 0.8 | 25 |
| 4 - Chaparrel - High Pocosin | 2 | 0.8 | 25 |
| 5 - 2' Brush | 3 | 1.2 | 17 |
| 6 - Dormant Brush - Black Spruce | 3 | 1.2 | 17 |
| 6 - Dormant Brush - Others | 3 | 1.2 | 17 |
| 7 - Southern Rough | 2 | 0.8 | 25 |
| 8 - Closed Timber Litter - Conifers | 3 | 1.2 | 17 |
| 8 - Closed Timber Litter - Hardwoods | 10 | 4.1 | 5 |
| 9 - Hardwood Litter - Conifers | 3 | 1.2 | 17 |
| 9 - Hardwood Litter - Hardwoods | 8 | 3.3 | 6 |
| 10 - Timber | 3 | 1.2 | 17 |
| 11 - Logging Slash, Light | 3 | 1.2 | 17 |
| 12 - Logging Slash, Medium | 3 | 1.2 | 17 |
| 13 - Logging Slash, Heavy | 2 | 0.8 | 25 |